

MAPP Program FY2014 Information Sheet

Program Overview and Goal

The mission of the Modeling, Analysis, Predictions, and Projections (MAPP) Program¹ is to enhance the Nation's capability to predict variability and changes in Earth's climate system. The MAPP Program focuses on the coupling, integration, and application of Earth System models and analyses across NOAA, among partner agencies, and with the external research community. Primary objectives include 1) improving Earth System models, 2) supporting an integrated Earth System analysis capability, 3) improving methodologies for global to regional-scale analysis, predictions, and projections, and 4) developing integrated assessment and prediction capabilities relevant to decision makers based on climate analyses, predictions, and projections.

FY2014 Competitions

In FY2014, the MAPP Program is soliciting proposals for the following two competitions:

- Research to Advance Understanding, Monitoring and Prediction of Drought
- Climate Test Bed---Research to Advance NOAA's Operational Systems for Climate Prediction

Individual proposals may target only one competition which must be clearly identified in the proposal summary. Details regarding the two MAPP Program FY2014 competitions are given below.

Competition: Research to Advance Understanding, Monitoring, and Prediction of Drought

Having the capacity to monitor droughts in near-real time and provide accurate drought predictions from weeks to a season in advance could greatly reduce the severity of social and economic damage caused by drought, a leading natural hazard for North America. NOAA has embraced the challenge to provide improved services that will help the Nation better prepare for and respond to drought and is leading the effort to develop the congressionally-mandated National Integrated Drought Information System² (NIDIS) together with its partners. The MAPP Program has a dedicated Drought Task Force³ that, in partnership with NIDIS, has focused on advancing drought understanding, monitoring, and prediction over North America and, by extension, across the globe. Despite great advances in the understanding of North American droughts and improved monitoring and forecasting tools, current drought monitoring and forecasting capabilities still fall short of users' needs. Drought stakeholders need more accurate depictions of drought in its various manifestations (lack of precipitation, dryness of soils, impacts on water resources). They also need more skillful and reliable drought forecasts, at regional scales and adequate lead times. Research is required to advance the systems that are used for drought monitoring and prediction, quantitatively assess current capabilities and generate progress toward fulfilling these needs. Research efforts on better understanding the predictability of drought processes and improving their representation in prediction systems are

needed to better quantify confidence in drought forecasts and identify system improvements that can potentially lead to higher prediction skill.

Given the societal benefits of improved monitoring and prediction of North American droughts, the MAPP Program is soliciting proposals for research in FY2014 to advance the understanding of North American droughts and the capability to monitor and predict them. Research proposals are sought that address one or both of the following research foci, and all or some of the aspects therein:

A. Understanding Predictability of Past Droughts over North America

Proposed research will explore major past North American droughts, focusing on the predictability of past droughts, processes underlying the droughts, and the capability to simulate and retrospectively predict them. Proposals will examine processes controlling drought development, intensification, and termination with a focus on predictability. Specifically, proposals will consider mechanistic studies involving model simulations and predictions to examine processes such as the role of land surface conditions, oceanic conditions, and atmospheric feedbacks; long-term factors, such as decadal variability or anthropogenically-driven trends versus immediate meteorological causes. Analyses should focus on examining the predictability of the processes underlying past drought events, and consider the ability of state-of-the-art forecast systems to predict them. Systematic evaluations of past drought events on a case-by-case basis should complement statistical analyses. The focus should be on major North American droughts for which adequate depictions exist and state-of-the-art retrospective predictions are or can be made available; analyses may include the most recent and potentially still on-going droughts, as appropriate. Investigators should consider how their proposed studies would advance Drought Task Force efforts to retrospectively assess causes and predictability of past U.S. droughts.

B. Advancing the Development of a National Drought Monitoring and Prediction System

Proposed research should aim to advance the development of a drought monitoring and prediction system at the national scale, but with regional detail. Proposals should address one or more of the following:

- Consider the opportunity to integrate diverse and newly available (remote-sensed and in situ) data sources and approaches (e.g. data assimilation, land surface budgets) to develop quantitative, objective and more accurate depictions of key physical aspects of drought occurrence. Proposals should aim to achieve more accurate and higher resolution depictions of quantities such as soil moisture, snow water equivalent, groundwater and underground water, incorporating the effects of irrigation and reservoir operation, as feasible. Approaches (e.g., probabilistic) to characterize uncertainties in drought-related quantities are highly encouraged. Proposals should

- aim to expand capabilities of current monitoring systems and providing improved initial conditions for drought prediction.
- Consider the opportunity to integrate state-of-the-art dynamical prediction systems, statistical methodologies, and improved initial conditions to develop more accurate and skillful regional-scale probabilistic drought predictions on intra-seasonal to seasonal time scales. Proposals should also consider the opportunity to improve forecasts (refining confidence) based on improved understanding of drought processes and predictability.

Proposals should consider state-of-the-art systems used by NOAA for drought monitoring and prediction on the national scale (e.g. the National Multi Model Ensemble, the National Land Data Assimilation System) when proposing advances. Proposals to develop systems applicable only to a particular U.S. sub-region are outside the scope of this call. Proposals should aim to improve official drought products used for national drought monitoring and prediction (the U.S. Drought Monitor and the Drought Outlook) in support of NIDIS.

Proposed approaches are required to include verification methodologies and an assessment of uncertainties as key elements of research proposals. As part of their verification efforts, investigators should consider applying elements of the Assessment Protocol⁴ developed by the Drought Task Force.

In reference to both foci above, research will consider North American drought comprehensively in its various manifestations, as meteorological, hydrological and agricultural; and global linkages. Successful proposers should expect to contribute to future Drought Task Force activities. Proposals should consider Drought Task Force research activities and projects, and should discuss how the proposed research would integrate and augment earlier and existing efforts, if funded. Proposals may be for projects with a duration of up to three years.

Competition: Climate Test Bed---Research to Advance NOAA's Operational Systems for Climate Prediction

NOAA provides operational climate prediction as part of its basic mission to protect life, livelihoods, and property. Research is ongoing at NOAA's laboratories and centers to deliver more skillful and comprehensive climate predictions that best address user needs. Scientific advances by the external research community also provide opportunities to improve NOAA's operational prediction systems. There is desire within the research community to test and evaluate experimental climate prediction models and methodologies for operational use and to improve on operational models by testing and evaluating model components and/or parameterization schemes from experimental models developed in the broader community. The U.S. climate research community has proven to be a valuable partner in providing more skillful

and comprehensive climate predictions through the successful migration of experimental models and methodologies into operational use.

To better address user requirements for short-term climate prediction, there is a need to foster a stronger operational component for prediction of intra-seasonal to inter-annual climate⁵. In this context, the MAPP program has partnered with the Climate Test Bed⁶ (CTB) for research to test and evaluate scientific advances with the potential to improve models and methodologies for operational climate prediction.

In the framework of the partnership between the MAPP Program and the Climate Test Bed, the MAPP Program is soliciting research proposals in FY2014 to advance NOAA's operational systems for climate prediction on intra-seasonal to inter-annual times scales. Research proposals will examine ways to improve operational systems by focusing on one or both of the following research foci:

1. *The performance of model components and/or parameterization schemes from dynamical climate models developed in the broader community when included experimentally in operational dynamical models.*
2. *The performance of experimental prediction methodologies (e.g. new calibration or post-processing techniques) or systems (e.g. experimental multi-model combinations or hybrid statistical/dynamical systems) developed in the broader community for operational purposes.*

Proposals relevant to this competition are required to have all the following attributes:

1. Comply with the Terms and Requirements for MAPP-CTB proposals⁷, including: demonstrating high relevance of the proposed work to advancing operational climate prediction, having explicit support from NCEP to access required data and models⁸, and using NCEP's metrics⁹ to evaluate proposed approaches at the end of the research project.
2. Leverage scientific advances by the research community external to NOAA's operational climate centers and seek to test and evaluate the potential of experimental models and methodologies for operational use.
3. Focus on model components and methodologies that are on the research frontier but are also mature enough to be considered for operational activities and have good potential to improve operational systems.

The duration of proposed research projects is 1-2 years. Proposals for the basic development of process model components or prediction methodologies are outside the scope of this funding opportunity. Key elements of successful proposals will be a feasible research and management plan for collaborative work with NCEP and the inclusion of specific metrics and benchmarks to assess the outcomes of the research activities. Proposals should aim to improve models/systems

and methodologies that are operational or that are being experimented with for operations⁸ (e.g. the National Multi Model Ensemble). Proposals should consider Climate Prediction Task Force¹⁰ activities and should discuss how proposed research would integrate and augment earlier efforts by the group, if funded. If appropriate, successful proposers may be asked to contribute to future Climate Prediction Task Force activities.

References

¹MAPP Program website:

<http://cpo.noaa.gov/ClimatePrograms/ModelingAnalysisPredictionsandProjections.aspx>

²NIDIS portal www.drought.gov

³MAPP Drought Task Force website:

<http://cpo.noaa.gov/ClimatePrograms/ModelingAnalysisPredictionsandProjections/MAPPTaskForces/DroughtTaskForce.aspx>

⁴Drought Task Force Assessment Protocol

http://cpo.noaa.gov/sites/cpo/Reports/MAPP/drought/DTF_Assessment_Protocol.pdf

⁵National Research Council, 2012. A National Strategy for Advancing Climate Modeling. Washington, DC. National Academy Press. http://www.nap.edu/catalog.php?record_id=13430

⁶NOAA Climate Test Bed goals, activities and plans may be found at:

<http://www.cpc.ncep.noaa.gov/products/ctb/ctb-home.shtml>

⁷MAPP-CTB Proposals Terms and Requirements:

http://cpo.noaa.gov/sites/cpo/Documents/pdf/MAPP_CT_B_Proposals_Requirements.pdf

⁸Data and models that are made available by NCEP for Climate Test Bed research are listed here:

http://www.cpc.ncep.noaa.gov/products/ctb/meetings/2013/List_of_NCEP_Model_Runs_and_Data_26July2013.pdf

⁹Metrics and assessment protocols defined by NCEP for Climate Test Bed research are listed here:

http://www.cpc.ncep.noaa.gov/products/ctb/meetings/2013/Metrics_climate_models&fcst_26July.pdf

¹⁰The MAPP Climate Prediction Task Force:

<http://cpo.noaa.gov/ClimatePrograms/ModelingAnalysisPredictionsandProjections/MAPPTaskForces/ClimatePredictionTaskForce.aspx>

General Guidelines for FY2014 MAPP proposal submission

Principal Investigators submitting a proposal in response to this MAPP Announcement are required to follow the Letters of Intent and Proposal preparation and submission guidelines given the Climate Program Office FY2014 Federal Funding Opportunity announcement.

Investigators are strongly encouraged to submit Letters of Intent prior considering submitting a full proposal. MAPP program Letters of Intent should be emailed to oar.cpo.mapp@noaa.gov.

Proposals must clearly identify in their summary which one of the above-listed MAPP competitions is being targeted (only one competition may be targeted by a given proposal).

Computational resources on NOAA's high-performance computing platforms are available for research in the MAPP Priority Areas above. Proposers who choose to request computational allocations on NOAA's platforms should include in their proposal a request describing the computational resources and data storage required, as well as a description of how they will port their model to the NOAA platforms (the request form for computational resources can be found at http://cpo.noaa.gov/sites/cpo/Documents/pdf/MAPP_FY14_HPC_Request_Form.docx). Questions regarding the use of NOAA's high-performance computing platforms should be directed to Dan Barrie.

Contact Information:

Manager for the Competition "Research to Advance Understanding, Monitoring, and Prediction of Drought": Dan Barrie (daniel.barrie@noaa.gov)

Manager for the Competition "Climate Test Bed---Research to Advance NOAA's Operational Systems for Climate Prediction": Annarita Mariotti (annarita.mariotti@noaa.gov)

Additional MAPP program contact information:

Annarita Mariotti, Acting MAPP Program Director

William Chong, Program Assistant (william.chong@noaa.gov)

Administrative questions regarding the Federal Funding Opportunity (e.g. proposal formatting or submission guidelines) should be directed to Diane Brown (diane.brown@noaa.gov).